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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

GILMAN, ALEXANDER

ART UNIT

PAPER NUMBER

2833

DATE MAILED: 07/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/547,561	Applicant(s) MATHIEU ET AL.	
	Examiner Alexander D Gilman	Art Unit 2833	<i>Am</i>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 and 38-82 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36, 38-82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7, 60 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

It is unclear, why 0.2 percent of linear change of the second element material leads to such a volume transformation (10 percent) that the second material comprises a second volume 90 percent of the first volume of the second element material.(p. 25, lines 15-27).

Claim Rejections - 35 USC § 102

1. Claims 1- 6, 8-15, 18- 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al.

With regard to claims 1-3, 8, Smith et al (US Pat. 5,613,861) disclose (Fig. 6) a system comprising :

a first substrate (14) with a plurality of first contact nodes (13) formed on the first substrate and a plurality of free-standing resilient interconnection elements (15) electrically contacts a corresponding a corresponding the contact nodes;

a second substrate (101) having a plurality of second contact nodes (3),

wherein the interconnection element (15) comprises:

a first element material adapted to be coupled to a substrate, and

a second different element material adapted to be coupled to the first element material, (col. 4, lines 42-44); and one of the first element material and the second element material comprises a

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material having a property that the material may be transformed in response to an external stimulus applied to one of the first and second element materials such that upon transformation, a geometrical shape of the interconnection element is irreversibly modified (col.5, lines 3-8) to a shape suitable for use as an interconnection element,

wherein the interconnection element has a portion thereof which is capable to a first position to contact with one of second contact nodes.

With regard to claim 4, Smith et al disclose that the transformable property is such that a first volume is adapted to be transformed to a different second volume.

With regard to claim 5, Smith et al disclose that the second element material overlies the first (for example, considering the first element as a non-conductive element, according to col. 4, lines 42-43).

With regard to claims 6, 20, Smith et al disclose that a transformation of the first and second material element is a result of exposing the first and/or second element to heat (col. 6, lines 36-39, specifically - the thermal evaporation).

With regard to claims 9, 11, Smith et al disclose the second element is introduced by plating and more specifically electroless plating (col. 6, lines 36-39 and col. 8, lines 61-62).

With regard to claim 10, Smith et al disclose the second element is introduced by sputtering (col. 6, lines 39-40).

With regard to claims 14, 15, , Smith et al disclose the second element comprises nickel or nickel alloy (col. 4, lines 44-46).

With regard to claim 18, Smith et al disclose that transformable property is a stress and transformation reduces the magnitude of the stress of the material (col. 5, lines 19-21).

With regard to claims 19, 21, Smith et al disclose that the second element material tensile and compressive stress and a deformation is a response to these stresses (col. 5, lines 11-21).

Claim Rejections - 35 USC § 103

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1. Claims 7, is, as they can be understood due to the 112 problem, rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al.

Smith et al, respectively disclose all of the limitations except for:

the second volume comprises about 90 percent of the first volume of the second element material (claims 7, 29, 60);

the spring material, coupled to the second element material, comprising at least about 90 percent of the interconnection element. (claim 34 and 65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to discover the claimed quantitative characteristics of the transformability volume and percent of spring material in the interconnection element, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Moreover, the specification does not disclose that the specified in claim percent of volume change is critical for the invention (p. 25, lines 18-20).

2. Claims 12, 13, are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Eldridge et al.

Smith et al disclose all of the limitations except for the first element material comprising palladium or its alloy.

Eldridge et al (US Pat. No. 5,832,601) disclose the first element material comprising palladium or its alloy (col. 14, lines 6-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al interconnection element comprising palladium or its alloy, as taught by Eldridge et al, as an alternative material for the first element.

3. Claims 16, 17, 22- 28, 30-32, 35, 38-44, 46, 48-51, 55-59, 61-63, 66, 69-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Faraci et al.

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With regard to claims 16, 17, 22, 24, 30, 44, 48, 51, 55, 61, 68 75, 76, and 79 Smith et al (US Pat. 5,613,861) disclose (Fig. 6) a system comprising :

a first substrate (14) with a plurality of first contact nodes (13) formed on the first substrate and a plurality of free-standing resilient interconnection elements (15) electrically contacts a corresponding a corresponding the contact nodes;

a second substrate (101) having a plurality of second contact nodes (3),

wherein the interconnection element (15) comprises:

a first element material adapted to be coupled to a substrate, and

a second different element material adapted to be coupled to the first element material, (col. 4, lines 42-44); and one of the first element material and the second element material comprises a material having a property that may be transformed in response an external stimulus applied to one of the first and second element materials such that upon transformation, a geometrical shape of the interconnection element is irreversibly modified, (col.5, lines 3-8),

wherein the interconnection element has a portion thereof which is capable to a first position to contact with one of second contact nodes.

Smith et al disclose all of the limitations except for the second element material comprising a shape memory alloy.

Faraci et al (US Pat. No. 5,810,609) disclose the second element material comprising a shape memory alloy (col. 14, lines 6-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al interconnection element comprising a shape memory alloy, as taught by, Faraci et al, to improve the Smith et al interconnection element elastic qualities..

With regard to claims 25, and 56, Smith et al when modified by Faraci et al disclose all of limitations as applied to claim 4 above.

With regard to claims 27, and 58, Smith et al when modified by Faraci et al disclose all of limitations as applied to claim 5 above.

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With regard to claims 28, 40, 59, and 71, Smith et al when modified by Faraci et al disclose all of limitations as applied to claims 6 and 20 above.

With regard to claims 31, and 62, Smith et al when modified by Faraci et al disclose all of limitations as applied to claims 9 and 11, above.

With regard to claims 32, and 63, Smith et al when modified by Faraci et al disclose all of limitations as applied to claim 10 above.

With regard to claims 35, and 66, Smith et al when modified by Faraci et al disclose all of limitations as applied to claims 14 and 15, above.

With regard to claims 38, and 69, Smith et al when modified by Faraci et al disclose all of limitations as applied to claim 18 above.

With regard to claims 39, 41, 70, and 72, Smith et al when modified by Faraci et al disclose all of limitations as applied to claims 19 and 21 above.

With regard to claim 23, Smith et al when modified by Faraci et al disclose a plurality of conductive signal lines associated with the substrate and the base of the interconnection element electrically contacts a corresponding one of the signal lines and (col. 4, lines 51-53).

With regard to claim 26 and 57, Smith et al when modified by Faraci et al disclose (Fig. 10-13) the free portion of the interconnection element material is initially fixed to the substrate (Fig. 11) and when the free portion is released from the substrate, the free portion is adapted to be biased away (col. 8, lines 43-45; Fig. 12).

With regard to claims 42, 43, 73, and 74 Smith et al when modified by Faraci et al disclose (Fig. 28).that the interconnection elements are coupled to more than one surface of the substrate and the first and the second contact points coupled through the re-distribution line and used as a part of a wafer-level test assembly.

With regard to claims 46, 49, 77, and 78, Smith et al when modified by Faraci et al disclose that the substrate comprises a component of a probe card (Fig. 29)

With regard to claim 50, Smith et al when modified by Faraci et al disclose the assembly is a part of a wafer-level test assembly (Fig. 26).

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4. Claims 33, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Eldridge et al.

Smith et al when modified by Faraci et al disclose all of the limitations except for the first element material comprising palladium or its alloy.

Eldridge et al (US Pat. No. 5,832,601) disclose the first element material comprising palladium or its alloy (col. 14, lines 6-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al interconnection element comprising palladium or its alloy, as taught by Eldridge et al, as an alternative material for the first element.

5. Claims 29, 34, 60, and 65 are, as they can be understood due to the 112 problem, rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Faraci et al.

Smith et al when modified by Faraci et al, respectively disclose all of the limitations except for:

transformation comprises at least 90 percent of transformable volume change of the second element material (claims 29, 60);

the spring material, coupled to the second element material, comprising at least about 90 percent of the interconnection element. (claim 34 and 65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to discover the claimed quantitative characteristics of the transformability volume and percent of spring material in the interconnection element, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

6. Claims 34, 36, 47, 52-54, 65, 67, and 80-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Faraci et al and further in view of Dozier II et al.

With regard to claims 34 and 65, Smith et al when modified by Faraci et al disclose all of the limitations except for a spring material coupled to the second element material.

Dozier II et al (US Pat. NO. 5,772,451) disclose (Fig. 2A) a spring material coupled to the second element material (col. 15, lines 44-50).

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al second element with the spring material coupled to the second element material, as taught by Dozier II et al, to improve the Smith et al interconnection element elastic qualities. With regard to claim 36 and 67, Smith et al disclose (Fig. 13) a contact material (19) adjacent a surface of the spring material (col. 8, lines 61, 62).

With regard to claim 47, Smith et al when modified by Faraci et al disclose all of the limitations except for the substrate comprising a socket for releasably connecting the electronic assembly to an electronic component.

Dozier II et al (US Pat. NO. 5,772,451) disclose (Fig. 3) the substrate (310) comprising a socket for releasably connecting the electronic assembly to an electronic component.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al substrate comprising a socket for releasably connecting the electronic assembly to an electronic component, as taught by Dozier II et al, to utilize the interconnection elements for LGA-sockets.

With regard to claims 52 and 80, Smith et al when modified by Faraci et al and Dozier II et al disclose (Dozier et al, Fig. 3) the second contact nodes (308) comprise external connection points.

With regard to claims 53, 54, 81, and 82, Smith et al when modified by Faraci et al and Dozier II et al disclose (Dozier et al, Fig. 3):

the third substrate (302) and a plurality of third contact nodes (306) (claims 53 and 81);

a stop structure (336) disposed on the first substrate (claims 54 and 82).

7. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al in view of Faraci et al and further in view of Khandros et al.

Smith et al when modified by Faraci et al disclose all of the limitations except for the substrate comprising an interposer.

Khandros et al (US Pat. NO. 5,994,152) disclose (col. 14, lines 24-34) the substrate comprising an interposer

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the Smith et al substrate comprising an interposer, as taught by Khandros et al, to utilize the interconnection elements for interposers.

Response to Arguments

Applicant's arguments filed 09/03/2002 have been fully considered but they are not persuasive. With regard to claims 1, 22, and 48, Applicants argue that the prior art (Smith et al) does not teach an external stimulus applied to the contact

Examiner respectfully submits that Smith et al disclose that contact would be bent into arc shape (col. 5, lines 6-8). Since bending is a result of an external force or factor (for example high temperature) it seems that an external stimulus applied to the contact.

Also, Applicants, argue that Smith teaches that the elastic properties of the spring contact of Smith are maintained despite thermal variations and mechanical shock. (Smith, col. 3, lines 5-10) and, hence, Smith teaches away from the thermal modification of the contact.

However, Smith discloses the elastic properties of the spring contact of Smith being maintained despite thermal variations and mechanical shock in process of operation of a device with such type of contacts. The range of thermal variations in process of operation (5-10 degrees C) is completely different from range of temperatures (300-500 degrees C) which are necessary for thermal modification of contact geometry.

With regard to claim 7, 34, 36, Applicants traverse the Patent Office's assumption that materials used by Smith are adapted to transform their volume as required by amended dependent claim 7.

Smith discloses (col. 4, lines 38-44) that the contact formed from metal. It is a fundamental physical law that metals transform their volume proportionally to temperature change

As for the claimed quantitative characteristics of the volume transformability and percent of spring material in the interconnection element (claims 7, 29, 34, 60, 65), it is shown in the rejection that, since general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Moreover, the specification does not

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disclose that the specified in claim 7 percent of volume change is critical for the invention (Specification, p. 25, lines 18-20).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander D Gilman whose telephone number is 571 272-2004. The examiner can normally be reached on Monday-Friday, 10:30 a.m. - 8:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paula A. Bradley can be reached on 571 272-2800 ext. 33. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

07/01/2004



ALEXANDER GILMAN
PATENT EXAMINER